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INTRODUCTION:

Groth's deflagration and detonation flame arresters are proven to prevent flame propagation in gas piping systems, which contain flammable gas/vapor mixtures. The arrester will only prevent flame passage under specified conditions while permitting free flow of gas/vapor through the system. Thus it protects vulnerable equipment or components of the system from damage due to explosive pressures caused by gas/vapor ignition in another part of the system. The deflagration and detonation flame arrester must be used under only those operating conditions for which it was designed and tested.

A flame arrester should be treated as a safety device and maintained by a knowledgeable maintenance technician. Carefully read and understand this manual before installing or servicing this product.

For information not contained in this manual, please contact:

Groth Corporation
13650 Promenade Blvd.
Stafford, TX, 77477
Phone: 281-295-6800
Fax: 281-295-6999

DEFINITIONS:

Maximum Experimental Safe Gap: the maximum gap of the joint between the two parts of the interior chamber of a test apparatus which, when the internal gas mixture is ignited and under specified conditions, prevents ignition of the external gas mixture through a 25 mm long joint, for all concentrations of the tested gas or vapor in air. The MESG is a property of the respective gas mixture. IEC 60079-1A standardizes the test apparatus and the test method.

Deflagration Flame Arrester: a flame arrester designed to prevent the transmission of a deflagration. It can be end-of-line or in-line.

Detonation Flame Arrester: a flame arrester designed to prevent the transmission of a detonation. It can be end-of-line or in-line.

Deflagration: explosion propagating at subsonic velocity.

Detonation: explosion propagating at sonic velocity and characterized by a shock wave.

Stable Detonation: a detonation is stable when it progresses through a confined system without significant variation of velocity and pressure characteristics.

Unstable Detonation: a detonation is unstable during the transition of a combustion process from a deflagration into a stable detonation. The transition occurs in a limited spatial zone where the velocity of the combustion wave is not constant and where the explosion pressure is significantly higher than in a stable detonation.

Pre-Ignition Pressure: is defined as the pressure in the pipeline at time of ignition.

GAS GROUPS:

NEC and IEC gas groupings are categorized by their respective Maximum Experimental Safe Gaps, see **Table 1** for a list of the gas groupings and their respective MESG. **Table 1** can be used in conjunction with the list of gases listed in the Process Fluid Specification section of this document (page 10). These tables are only guidelines. If a Model 7758A Flame Arrester is mounted in a process that is not clearly understood or is outside of the gas groupings listed in this document, consult the factory.

TABLE 1: NEC AND IEC GAS GROUPINGS

NEC	IEC	MESG
D	IIA1, IIA	> 0.035" (0.90mm)
C	IIB1, IIB2, IIB3	> 0.026" (0.65mm)
B	IIB+ H ₂	> 0.020" (0.50mm)
A	IIC	< 0.020" (0.50mm)

ARRESTER DESIGN AND FUNCTION:

The Model 7758A flame arrester consists of three main components; inlet base, outlet base and the flame element housing (as shown in **Figure 1**). The bases serve as the connecting interface to the piping system. The housing retains and supports the flame element. Both components are essential in stopping the passage of the flame.

The flame element consists of multiple layers of metal wire cloth, laminated and sintered into a strong, ductile, corrosion resistant and uniform sheet. The sheets are cut to various sizes and fit into cylindrical metallic housings. The element is supported by rigid beams, which are securely welded to the housing to withstand the extreme pressures of an unstable detonation. The rigid beams also transmit the heat of a continuously burning flame front from the element to the housing. Each size arrester can be supplied with several element sizes to provide increased flow capacity.

The bases must also withstand the detonation pressures while conveying the burning vapors and flame front to the element. Depending on the design of the system in which it is used, the arrester bases can include optional ports for thermocouples or pressure monitoring devices. These devices can activate warning or shutdown systems when abnormal conditions are detected. Both bases may be equipped with large diameter inspection/clean-out ports for in-line maintenance of the element. If element removal is required for inspection, maintenance or replacement see maintenance instructions.

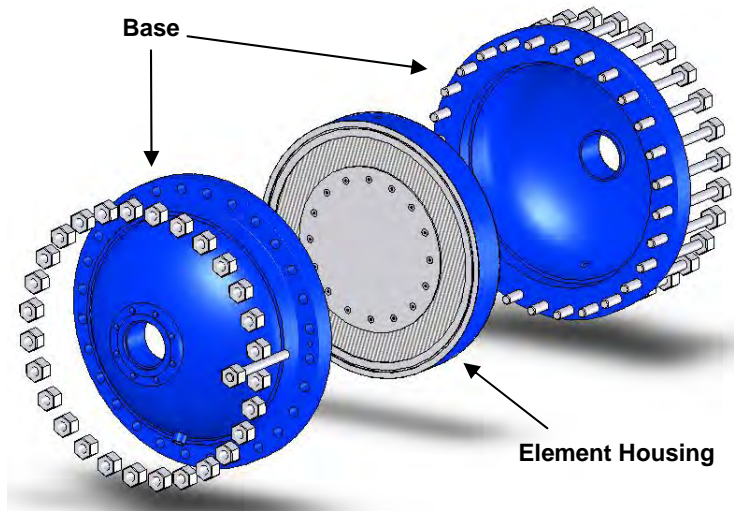


Figure 1: 7758A Flame Arrester Assembly

Note

Flame arresters installed in ATEX (94/9/EC Directive, tested to EN12874) applications are tested for short time burning. These arresters are not tested to withstand a continuous flame, and must have a flame monitoring system capable of shutting down the vapor flow within one minute.

SAFETY WARNINGS:

DO NOT PIPE DRAINAGE, INSTRUMENTATION, AND/OR CLEANOUT CONNECTIONS TO A COMMON LINE AS THIS CAN PROVIDE A PASSAGE FOR A FLAME TO BY-PASS THE FLAME ARRESTER ELEMENT. IF THE FLAME WERE TO BE ABLE TO BY-PASS THE FLAME ARRESTER ELEMENT A FLAME FRONT COULD POTENTIALLY HARM BOTH PROCESS EQUIPMENT AND SITE PERSONNEL.

THE MODEL 7758A DEFLAGRATION AND DETONATION FLAME ARRESTER MAY BE EXPOSED TO INSTANTANEOUS PRESSURE SPIKES IN EXCESS OF 1000 PSIG. ANY INSTRUMENTATION ATTACHED TO THE ARRESTER MUST BE CAPABLE OF CONTINUED OPERATION IN THIS ENVIRONMENT.

FAILURE TO REPLACE A DAMAGED FLAME ELEMENT CAN RENDER THE FLAME ARRESTER INEFFECTIVE. IT IS SUGGESTED THAT A FLAME FRONT DETECTION SYSTEM BE USED TO MONITOR PIPELINE STATUS. IF A FLAME FRONT IS SENSED, IT IS SUGGESTED THAT THE FLAME ARRESTER ELEMENT BE CHECKED FOR ANY DAMAGE CAUSED BY THE FLAME FRONT.

THE MODEL 7758A DEFLAGRATION AND DETONATION FLAME ARRESTER MAY NOT BE EFFECTIVE IN STOPPING FLAME PROPAGATION IN SYSTEMS WHICH CONTAIN VAPORS WITH AN MAXIMUM EXPERIMENTAL SAFE GAP (MESG) LESS THAN 0.026" [0.65 MM] OR WHEN ANY OF THE OPERATING CONDITIONS STATED HEREIN ARE EXCEEDED.

THE LIFTING HANDLE ON THE ELEMENT HOUSING IS TO BE USED FOR HANDLING THE HOUSING ONLY DURING INSPECTION AND MAINTENANCE. DO NOT USE THESE EYES TO LIFT THE ENTIRE MODEL 7758A DEFLAGRATION AND DETONATION FLAME ARRESTER, THESE LIFTING EYES ARE NOT DESIGNED TO HANDLE THE WEIGHT OF THE ARRESTER.

BEFORE INSPECTION AND CLEANING THE ARRESTER, THE CONNECTING PIPELINE MUST BE FREE OF ALL HAZARDOUS OR FLAMMABLE VAPORS BEFORE INSPECTION PROCEDURES BEGIN. BEFORE DISASSEMBLING ARRESTER CONSULT MATERIAL SAFETY DATA SHEETS (MSDS) FOR ALL PRODUCTS THAT THE ARRESTER WAS EXPOSED TO IN SERVICE. THE COMPONENTS SHOULD BE CLEANED ACCORDING TO MSDS PROCEDURE. TAKE APPROPRIATE SAFETY PRECAUTIONS REGARDING EYE PROTECTION, SKIN CONTACT & RESPIRATION.

FLAME SENSING EQUIPMENT IS SUGGESTED FOR VERIFICATION OF A FLAME FRONT. IF A FLAME FRONT IS DETECTED THE GAS SUPPLY NEEDS TO BE STOPPED OR ISOLATED FROM THE ARRESTER TO PREVENT A FLAME FRONT FROM CONTINUOUSLY BURNING AT THE FLAME ARRESTER ELEMENT. IF THE FLAME FRONT IS ALLOWED TO BURN AT THE FLAME ARRESTER ELEMENT, THE FLAME ARRESTER COULD ALLOW THE FLAME FRONT PASS AND DAMAGE DOWNSTREAM EQUIPMENT AND/OR PERSONNEL.

SPECIFICATIONS:

The Groth Model 7758A deflagration and detonation flame arresters are constructed and tested to the United States Coast Guard [USCG] specifications for Marine Vapor Control Systems (33 CFR, Part 154, Appendix A) and EN12874 (CE mark certification is in accordance with EU Directive 94/9/EC, ATEX). The examination certificate, issued by FM Approvals, is #FM08ATEX0056.

The Groth Model 7758A is certified for both NEC Group D & C vapors (IEC Groups IIA, IIB1, IIB2, and IIB3), vapors with a Maximum Experimental Safe Gap (MESG) of 0.026" (0.65mm) or greater.

Table 2 lists the typical operating parameters of each size arrester. These are the operating parameters that the Model 7758A flame arrester has been tested under. If an application is outside of these operating parameters consult the factory for assistance.

TABLE 2: MODEL 7758A FLAME ARRESTER OPERATING PARAMETERS

Arrester Size IN [DN]	Element Sizes IN [DN]	Maximum Burn Time (Minutes)	Minimum Operating Temperature (°F [°C])	Maximum Operating Temperature (°F [°C])	Maximum Pre-Ignition Pressure		
					Deflagrations psia (bara)	Stable Detonations psia (bara)	Unstable Detonations psia (bara)
2 [50]	4 [100]	30	-4 [-20]	140 [60]	19.7 [1.36]	19.7 [1.36]	19.7 [1.36]
2 [50]	6 [150]	30	-4 [-20]	140 [60]	19.7 [1.36]	19.7 [1.36]	19.7 [1.36]
2 [50]	8 [200]	30	-4 [-20]	140 [60]	19.7 [1.36]	19.7 [1.36]	19.7 [1.36]
3 [80]	6 [150]	30	-4 [-20]	140 [60]	19.7 [1.36]	19.7 [1.36]	19.7 [1.22]
3 [80]	8 [200]	30	-4 [-20]	140 [60]	19.7 [1.36]	19.7 [1.36]	19.7 [1.36]
3 [80]	10 [250]	30	-4 [-20]	140 [60]	19.7 [1.36]	19.7 [1.36]	19.7 [1.36]
3 [80]	12 [300]	30	-4 [-20]	140 [60]	19.7 [1.36]	19.7 [1.36]	19.7 [1.36]
4 [100]	8 [200]	30	-4 [-20]	140 [60]	19.7 [1.36]	19.7 [1.36]	19.7 [1.36]
4 [100]	10 [250]	30	-4 [-20]	140 [60]	19.7 [1.36]	19.7 [1.36]	19.7 [1.36]
4 [100]	12 [300]	30	-4 [-20]	140 [60]	19.7 [1.36]	19.7 [1.36]	19.7 [1.36]
4 [100]	20 [500]	30	-4 [-20]	140 [60]	19.7 [1.36]	19.7 [1.36]	19.7 [1.36]
6 [150]	12 [300]	30	-4 [-20]	140 [60]	19.7 [1.36]	19.7 [1.36]	19.7 [1.36]
6 [150]	20 [500]	30	-4 [-20]	140 [60]	19.7 [1.36]	19.7 [1.36]	19.7 [1.32]
6 [150]	26 [650]	30	-4 [-20]	140 [60]	19.7 [1.36]	19.7 [1.36]	19.7 [1.36]
6 [150]	30 [750]	30	-4 [-20]	140 [60]	19.7 [1.36]	19.7 [1.36]	19.7 [1.36]
8 [200]	20 [500]	30	-4 [-20]	140 [60]	18.7 [1.29]	18.7 [1.29]	18.7 [1.29]
8 [200]	26 [650]	30	-4 [-20]	140 [60]	18.7 [1.29]	18.7 [1.29]	18.7 [1.29]
8 [200]	30 [750]	30	-4 [-20]	140 [60]	18.7 [1.29]	18.7 [1.29]	18.7 [1.29]
10 [250]	26 [650]	30	-4 [-20]	140 [60]	18.7 [1.29]	18.7 [1.29]	18.7 [1.29]
10 [250]	30 [750]	30	-4 [-20]	140 [60]	18.7 [1.29]	18.7 [1.29]	18.7 [1.29]
12 [300]	30 [750]	30	-4 [-20]	140 [60]	18.7 [1.29]	18.7 [1.29]	18.7 [1.29]

INSTALLATION:

Based on the testing conditions, Groth Model 7758A deflagration and detonation flame arrester may be installed in piping systems where:

1. The MESH of the vapor constituent(s) is greater than or equal to .026" (0.65 mm).
2. System operating pressure is less than or equal to the tested pre-ignition pressure [listed in **Table 2**].
3. Operating temperature is between -4° F (-20° C) and 140° F (60° C).
4. The piping system in which the flame arrester is to be installed must not exceed the arrester flange size.

All Groth flame arresters are bi-directional and can be used in vertical or horizontal piping systems. This series of flame arresters are available with 150# ANSI or DIN flanges of equal pressure rating. Follow the torque guidelines listed in **Table 3** for flange make-up torque.

WARNING

The Model 7758A flame arrester housings or adjacent piping may have various pipe taps for pressure sensing, temperature sensing, condensate drainage, etc. Never connect such taps to a common line or system as this could provide a flame bypass around the flame arrester element.

The following guidelines should be observed at installation:

1. Remove any flange protectors and discard all packing material.
2. Inspect the gasket seating surface of the mating flanges. It must be clean, flat, free of scratches, corrosion and tool marks.
3. Inspect the gasket; make sure that the material is suitable for the application.
4. Lubricate all studs and nuts with an appropriate thread lubricant. If the arrester is exposed to a high temperature service or stainless steel fasteners are used, select an anti-seize compound such as moly-disulfide.
5. Center the gasket within the bolt circle.

WARNING

The lifting handle on the element housing is to be used for handling the housing only during inspection and maintenance. DO NOT use this handle to lift the entire flame arrester assembly.

6. Set the arrester between its mating flanges. Position the lifting handles and jacking bolts to facilitate future removal of the flame arrester housing. Position the drain and instrument ports to provide proper access and function. (When installing the arrester in a horizontal pipeline, use the lowest (typically 1" ports) to drain condensed vapors from the housing. Note the above warning when connecting the drain piping). Install the studs and tighten nuts hand tight.
7. Torque all fasteners to half the value listed in **Table 3** in a staggered, alternating pattern to provide an evenly compressed gasket joint. (Torque is an average value based on a nitrile binder synthetic gasket, 1/32" thick and lubricated threads).
8. Make up the final torque and check that no further nut rotation occurs at the specified torque value.

TABLE 3: FLANGE BOLTING\ TORQUE REQUIREMENTS

Flange Size In [mm]	Torque Lb·Ft [N·m]
2 [50]	70 [95]
3 [80]	70 [95]
4 [100]	70 [95]
6 [150]	110 [150]
8 [200]	110 [150]
10 [250]	170 [230]
12 [300]	170 [230]

WARNING

After installation, all connections must be inspected for vapor leakage. This may be accomplished by static test, gas detector, or "bubble" test using a soap solution, see Test Procedure section for further details.

MAINTENANCE:

For maximum operating efficiency, the element of a Model 7758A flame arrester must be inspected and maintained at regular intervals. Maintenance is accomplished by removing the element assembly for inspection and cleaning or replacement. Frequency of inspection should be evaluated by the user through actual service experience. Inspection of wetted components is recommended at least once per year or any time that one of the following conditions occur:

- Excessive pressure drop is encountered at a known flow rate.
- A flame front is detected.

WARNING

The connecting pipeline must be free of all hazardous or flammable vapors before inspection procedures begin. Before disassembling arrester consult Material Safety Data Sheets (MSDS) for all products that the arrester was exposed to in service. The components should be cleaned according to MSDS procedure. Take appropriate safety precautions regarding eye protection, skin contact & respiration.

1. When removing the element housing for maintenance, support the weight by attachment to the housing handles, or lifting eyes, and proceed as follows.

WARNING

Handles or lifting eyes on the element housing are to be used for handling the housing only during inspection and maintenance. DO NOT use these eyes to lift the entire flame arrester assembly.

2. Loosen the hex nuts and remove only those studs or tie rods necessary to withdraw the housing.
3. On the remaining studs, loosen the holding nuts and use the spreader bolts to separate the base halves from the housing. To remove the flame element housing the bases need to be separated at least $\frac{1}{4}$ ". Use spacer blocks or spreader tools to safely secure the base halves so the housing is free for removal. The remaining studs will support and position the housing.

WARNING

In a horizontal line, the element housing assembly should be supported before removing the studs. Use structures and equipment suitable for supporting the components weight. Consult factory if weight of arrester is unknown.

4. Remove the flame element housing assembly for inspection (**Figure 2**). The flame element mesh and supporting grids shall be visually inspected for damage or corrosion build-up from both sides. If the flame element mesh appears to be damaged, it shall be replaced immediately.
5. Inspect the surfaces of the element for corrosion or foreign material that appears to be restricting the passageways. If the flame element is plugged it can be cleaned by one of the following methods:
 - Compressed air.
 - High-pressure steam or water purge.
 - Solvent wash followed by compressed air.
 - Wire brush cleaning the element surface.
6. Inspect the sealing gasket for damage and replace if necessary. Groth strongly suggests replacing the gaskets each time the flame element housing is removed. See the Recommended Spare Parts, page 9.
7. Reassemble the housing, elements and gaskets. Tape the gaskets to the housing with a thin tape, such as masking tape. Then insert the housing assembly between the base flanges.
8. Lubricate all studs and nuts with an appropriate thread lubricant. If the arrester will see high temperature service select an anti-seize compound such as moly-disulfide.
9. Lower the flame element housing into the arrester assembly. The remaining studs will position the housing on the base centerline. Loosen the Spreader Bolts and any other flange spreading equipment on both sides of the arrester to allow the element housing to be held by the bases.

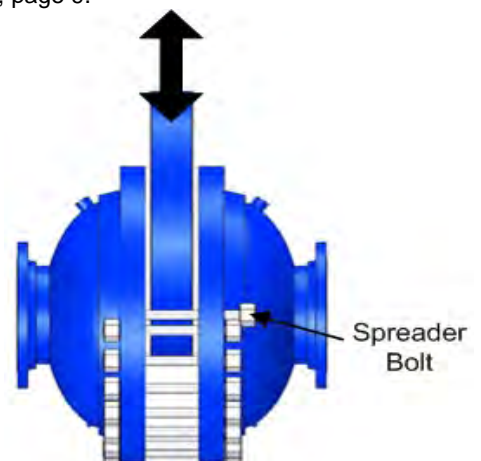






Figure 2: 7758A Element Housing Removal Illustration

10. Insert the missing studs and nuts, tighten nuts hand tight. Once all of the nuts have been hand tightened use a torque wrench to tighten all nuts to half the torque value listed in **Table 4** in a staggered, alternating pattern to provide an evenly compressed gasket joint.
11. Make up the final torque and check that no further nut rotation occurs at the specified torque value. The torque values are based on original gaskets supplied by Groth Corporation.

TABLE 4: ARRESTER ELEMENT HOUSING STUD TORQUE REQUIREMENTS

Stud Size	Torque Lb*Ft (N*m)
5/8"	60 [81]
3/4"	110 [149]
7/8"	190 [258]
1-1/8"	430 [584]
1-1/4"	600 [814]

NAMEPLATE:

 <p align="center">GROTH CORPORATION STAFFORD, TX USA</p>  0637  II G EN12874  <p align="center">FM APPROVED</p>	MODEL:
	S/N:
	MFG. DATE:
	TAG:
	FLANGE:
	GAS GROUP:
	TYPE:
	TYPE II ENDURANCE BURN TIME:
	MAX. OP. PRESSURE:
	MAX. OP. TEMP:
CERT. NO:	
A CONTINENTAL DISC COMPANY	

LEAK TEST PROCEDURE:

To test the 7758A Deflagration and Detonation Flame Arrester the complete assembly must be assembled as specified herein. Bolt blind flanges to both the inlet and outlet flanges of the flame arrester. One of the blind flanges shall have a tap which pneumatic pressure will be applied. Apply 15 psig pneumatic pressure to the flame arrester. Check for leaks at all of the pressure joints. Use either a liquid soap and water or Liquid "Snoop" to detect for any leaks. A leak is defined as any area where a bubble is created from gas escaping the flame arrester. If there is a leak between any of the mating parts, retighten all of the nuts around the circumference of the arrester in a staggered, alternating pattern. If retightening does not stop the leak, remove the element, as explained in previous section, check the gaskets and reassemble the arrester. After reassembly, once again leak test the arrester.

RECOMMENDED SPARE PARTS:

- Flame Bank Assembly: FBA7758XXYZ
XX – Housing Size
Y – Housing Material (3-Carbon Steel, 5-316 SS, 8-Hastelloy C)
Z – Element Material (5-316 SS, 8-Hastelloy C)

Consult factory for kits or recommendations.

MODEL 7758A BILL OF MATERIAL:

ITEM	DESCRIPTION	STANDARD MATERIALS OF CONSTRUCTION			OPTIONAL FEATURES
		CARBON STL <input type="checkbox"/>	316 SS <input type="checkbox"/>	316/HAST <input type="checkbox"/>	<input type="checkbox"/>
1	BASE	CS	316 SS	316 SS	<input type="checkbox"/>
2	STUD	SS	SS	SS	<input type="checkbox"/>
3	NUT, HEX	SS	SS	SS	<input type="checkbox"/>
4	LOCK WASHER	SS	SS	SS	<input type="checkbox"/>
5	* GASKET	NON-ASB	NON-ASB	NON-ASB	<input type="checkbox"/>
6	HOUSING, ELEMENT	CS	316 SS	316 SS	<input type="checkbox"/>
7	ELEMENT, FLAME	316 SS	316 SS	HAST	<input type="checkbox"/>
8	RETAINER, OUTSIDE	CS	316 SS	316 SS	<input type="checkbox"/>
9	RETAINER, INSIDE	CS	316 SS	316 SS	<input type="checkbox"/>
10	PLUG, PIPE	CS	316 SS	316 SS	<input type="checkbox"/>
11	CAPSCREW, COUNTERSINK	SS	SS	SS	<input type="checkbox"/>
12	BOLT, SPREADER (HEX)	SS	SS	SS	<input type="checkbox"/>
13	EYEBOLT (10"-30" ONLY)	SS	SS	SS	<input type="checkbox"/>

* SPARE PARTS

DWG. NUMBER:
BOM NUMBER:

C-93536
93536BOM.XLS

Rev.: A



MODEL NUMBER IDENTIFICATION:

Model	Nominal Size	Element Size	Body Material	Element Material	Flange Specification	Options
□□□□□	□□	□□	□	□	□	□□□□
7758A	02"-12"	05"-30"	3 = Carbon Steel 5 = 316 SS 8 = Hastelloy C276	5 = 316 SS 8 = Hastelloy C276	A = 150# ANSI B = PN10 DIN C = PN16 DIN	0 = No Options T= Integrated Thermocouple (include Thermowell) X= Integrated Thermowell Z= Consult Factory
NOTES	Include model number when ordering. For special options, consult factory For all flange and element size combinations see Table 2 above EXAMPLE: 7758A - 02 x 05 – 3 5 – A 0 0 <i>Indicates a 2" Model 7758A with 5" Element Size, Carbon Steel Body, 316 SS Flame Element, 150# Flanged Outlet, and no options</i>					

PRODUCT LIMITED WARRANTY

- A. Seller warrants that products which are manufactured by Seller, are manufactured in accordance with published specifications and free from defects in materials and/or workmanship for a period of (12) twelve months. Seller, at its option, will repair or replace any products returned intact to the factory, transportation charges prepaid, which Seller, upon inspection, shall determine to be defective in material and/or workmanship. The foregoing shall constitute the sole remedy for any breach of Seller's warranty.
- B. THERE ARE NO UNDERSTANDINGS, AGREEMENTS, REPRESENTATIONS, OR WARRANTIES, EXPRESS OR IMPLIED, (INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE REGARDING PRODUCTS) UNLESS SPECIFIED IN THE SALES CONTRACT . THIS CONTRACT STATES THE ENTIRE OBLIGATION OF SELLER.

Seller makes no warranties, either express or implied, except as provided herein, including
- C. without limitation thereof, warranties as to marketability, merchantability, for a particular purpose or use, or against infringement of any patent of products. In no event shall Seller be liable for any direct, incidental or consequential damages of any nature, or losses or expenses resulting from any defective new product or the use of any such product, including any damages for loss of time, inconvenience, or loss of use of any such product.
- C. The original Manufacturer shall be solely responsible for the design, development, supply, production, and performance of its products hereunder, and the protection of its trade name or names, if any. It assumes no responsibility, for products modified or changed in any way by its agent or customer. Any such modifications or changes to products sold by Seller hereunder shall make the product limited warranty null and void.
- D. The Manufacturer shall be under no obligation to manufacture, sell, or supply, or to continue to manufacture, sell or supply any of the Products.